# The Citrus Industry

**Representative of Every Interest**

**Representing No Special Interest**







Single Copy ..... 15 Cents

Subscription
$1.00 Per Year In Continental U. S.
$2.50 Per Year Outside


## *Looking Ahead*

In the course of a very short time the 1959-1960 citrus marketing season will be under way.

The past season has been a very satisfactory one from every standpoint and the outlook is for an equally satisfactory season now facing us.

Growers have been exerting every effort to produce top quality fruit which will please the ultimate consumer. Advertising plans by the Florida Citrus Commission and Florida Citrus Mutual and by the producers of frozen orange concentrate will eclipse every previous effort, so that there should be a greater demand for Florida fruit than ever before.

The outlook for the coming season looks very good indeed!

VOL. 40 — NO. 9 SEPTEMBER, 1959 BARTOW, FLORIDA

# Managing And Care Of... Young Citrus Trees

FRED P. LAWRENCE
Citriculturist, Florida Agricultural Extension Service
At 26th Annual Camp McQuarrie Institute, August 10-14, 1959

## I. INTRODUCTION

No startling new discoveries or rare scientific data have been released this year in the field of young cirtus trees that we can comment on, but, with over 100,000 acres in Florida falling into this category, we felt that a review of recommended practices would be of interest to members of the Institute.

Managing and caring for young citrus trees can be divided into eight major steps. They are: planting, watering, fertilizing, cover cropping, cultivation, pruning, spraying, and banking. You may disagree with me in some places, but you must agree that a successful operation will require all eight and possibly a few more.

## II. PLANTING

We are assuming that a suitable site for a grove has been selected and is ready to plant. Soil preparation is the first step. An excellent recommendation is that the grove site be cleared, limed, and planted to a cover crop at least one year in advance of planting. True, this practice is seldom followed; nevertheless, it is not archaic. It is a good procedure because this interval provides ample time for contracting, growing, or purchasing the very best possible trees—if at all possible, registered trees. Plans should be made to plant during the dormant season. Of course, citrus trees can be planted during any month of the year, but we feel that winter and early spring plantings have considerably more in their favor.

A practical approach to prepare the land for planting is to chop the cover crop in October, leaving it pretty well on the surface of the soil, cultivating only to the point that it will not be a fire hazard. Next, the land should be "laid off" only sufficiently to locate the tree rows. The tree rows should be plowed four to six inches deep in at least a four-foot strip, then leveled and let stand with the cover crop rotting until planting time. The leveled tree rows should be staked or otherwise marked off.

*Fred P. Lawrence*

* * * * * *

At planting time the cardinal principle is: **be prepared to receive the trees.** Check the source to see that they are dug with sufficient root system and are topped to a hat rack. Incidentally, Dr. Gordon Grimm has done considerable research in establishing the cause of young tree die-back and in the precautions necessary to prevent tree losses at planting time. This is available in the 1956 Proceedings of the State Horticultural Society. When the trees arrive, all tools, equipment, and trained men should be standing by. Trees must not be left on the truck unless it is especially designed or adapted for this use. Never leave trees under a tarpaulin on a hot day. Take out only those necessary to supply a planting crew for one to two hours and heel the others in or stack them under the shade and keep them moistened and cool. The roots should be well covered with excelsior, moss, sawdust, or soil and kept wet.

Some growers believe in planting dry; that is, they plant the trees without water using only the dry soil from the hole packed around the roots. Watering takes place within a few minutes to an hour or more after they are planted. This is a common practice today and it is claimed to be faster. Actually, this is not too bad in the winter and early spring; however, it has many disadvantages. Mainly, if the soil is dry and/or hot it tends to dry out the feeder roots and injure them permanently prior to watering and, in the coarser, heavier soils, it leads to the forming of clods which afford air pockets and resultant tree injury.

Wet planting is far superior. To do the job right usually requires one water truck for each planter. This is a good practice because trees can be kept in water barrels on the truck until they are ready to set. Broken roots and branches should be trimmed away but many times far too extensive root pruning is practiced by the tree handler. The more good roots, the less the shock to the tree. Caution should also be taken to see that the tree is not planted too deep. As soon as it is "mudded-in," the water cup should be made and filled with five to ten gallons of water. This is not imperative if plans are made to double back each evening and water all trees set that day.

Dr. Grimm's research showed that a ⅝ to 1 inch tree seemed to be the best size for planting. This size tree has more feeder roots to balance the top and the shock of transplanting is not so great as in larger trees.

## III. WATERING—POST-SETTING

Water the trees in during planting, double back at the end of the day, and re-water all trees set that day. Water the trees again on the second day and again on the sixth day. After this, they should be watered every seven to ten days until they become established. Avoid letting the trees go into a wilt for the lack of water. When newly set trees wilt, the feeder roots are

damaged and the tree is stunned.

Disregard all showers under one inch during planting and through the first four weeks thereafter.

**IV. FERTILIZING**

Next to planting, this is the most important operation in managing the citrus tree. Many reports of fertilizer burn and damage to young trees have been coming in during the past eighteen months.

More and more growers are making the mistake of putting fertilizers, soil amendments, and other materials in the holes and water tanks during planting. To that rare individual who asks what he should use in the hole in planting the tree, the answer still is, "only soil and water." Actually, both of our experiment stations are conducting research in this area and only last week we had the pleasure of talking with Dr. Gordon Rasmussen relative to his experiments. This work is not finished, and no final report can be issued; but based upon the evidence at hand, we concluded that it is doubtful that the practice of mixing such materials as colloidal phosphate, dolomite, vermiculite, or other similar products with the soil **at planting time** is an economic one on the better citrus soils. On the extremely droughty ones such as the lakewood series it may pay. Avoid mixing dry fertilizer in the water tank. It is too dangerous.

The best advice we can give you is to follow the recommendations in Bulletin 536A. Since this bulletin is only today being officially released, we would like to quote part of the information:

"This section concerns the fertilization of groves up to the age of ten years, planted in previously uncultivated acid sandy soils. The soil conditions found in such cases are somewhat different from those found in heavily fertilized old-grove soils. Uncultivated soild are generally very infertile with respect to all the essential elements except phosphorus in some cases. Therefore young trees in previously unfertilized soils should receive regular applications of nearly all essential elements. Trees in replanted areas or occasional replants in present groves should receive the fertilizer mixtures recommended for bearing trees, but in reduced amounts sufficient to give about the same nitrogen and potassium levels as recommended for trees planted on new land (Table 2).

"Many fertilizer formulas may be

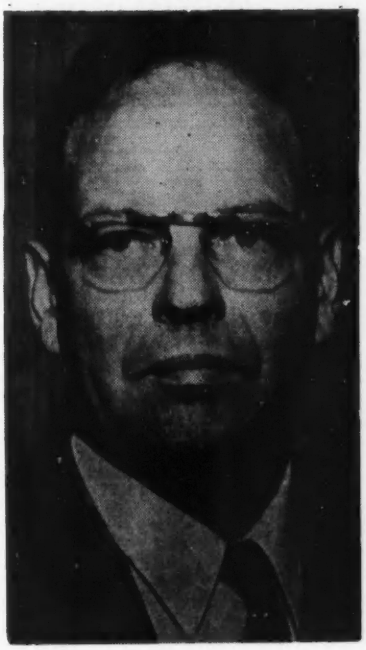
(Continued on page 9)

The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

# Planting And Thinning Practices For Maximum Production... A Look Into The Future

. . . By . . .



*R. E. Norris*
*Lake County Agricultural Agent*

* * * * * *

Soothsayers and crystal ball gazers are of no value among citrus growers to point up the fact that adjustments are needed to remedy some serious problems in groves resulting from close spacing of trees. Yet it is recognized economic necessity that growers, confronted with ever-increasing costs of land, taxes, materials and services, must maintain the highest possible production and quality potential on each acre planted to citrus.

Growers of most tree fruits in general, and of citrus fruits in particular, have long recognized that close spacing of trees resulted in increased fruit production during the early years following the planting of the grove. Most growers calculate to alleviate the crowded condition in their groves by the removal of certain trees once the trees become sufficiently large to interfere with the normal growth and development of each other. But when the time for removing them actually comes about the thought of removing healthy trees induces severe mental anguish among growers and less painful measures for overcoming the problem are sought.

There are numerous methods of managing closely set trees. In this paper it is proposed to briefly discuss the following:

1. Hedging
2. Thinning by tree removal
3. Topping or "buckhorning"
4. Close spacing and subsequent thinning

1. Hedging is one means of alleviating the crowded condition in groves. It was used by a few growers in the early '50's and has gained in popularity in recent years. It is especially advantageous in tangerine plantings where the percent of pack-out is generally increased substantially due to the increased fruit sizes beginning the first year after hedging. The practice is popular also in orange and grapefruit plantings. Production is generally reduced from 1 to 3 years following hedging in these varieties, but the practice results in better sizes, better rind color, higher solids and cleaner fruit. The hedging operation opens tree middles thus enabling the more effective operation of tractors, spray rigs, fertilizer distributors, discs and picking crews and allows more light in the tree middles which results in better cover crops.

More information on the general subject of hedging and the equipment used for the work may be found in Extension Service Circular 115 and Experiment Station Bulletin 519.

Hedging generally costs from 10 cents to 75 cents a tree depending on the type of equipment used in the hedging operation, the size of the trees, amount and size of the brush and how its disposal is handled.

2. Thinning by Tree Removal

Two separate operations in which thinning by tree removal has been

* Presented at the 6th Annual South Florida Citrus Institute. Camp Cloverleaf, June 3, 1959.

practiced will be discussed briefly.

Grove A is a 20-year old Hamlin block budded on rough lemon rootstock and spaced 15 x 25. The soil is a deep phase of Lakeland fine sand. The trees were never hedged or otherwise pruned back. The limbs had interlocked badly and were dying as the result of shading. During the 5 seasons prior to the tree removal operation fruit production decreassed markedly.

During January and February, 1956 every other tree in the 15-foot row was removed. The wood under 4 inches in diameter was run thru a chipping machine and the chips were incorporated into the soil. The stumps were removed with a bulldozer.

The grower estimated his labor cost for removing these trees at $1.50 per tree.

Grove B is an 18-year old Valencia block budded on rough lemon rootstock. It was planted 15 x 30 on a good grade of Eustis fine sand.

The operation involves the removal of alternate trees in the 15-foot spacings. Only 50 trees a year are removed from the block so as to avoid a serious reduction in the crop in any one year.

Comparative yield data (before and after thinning the stand of trees) are not available for this grove because trees have been removed from the block every year from 1953 to and including 1959. However, close inspection of rows from which the alternate trees were removed in 1953 and 1954 indicates that the trees left in place have thus far not gained increased production by virtue of having been allotted increased space. It should be pointed out that the limbs of the trees were becoming interlocked prior to the time the alternate tree removal operation commenced and had these trees not been removed, crowding would have seriously hampered production by this time, it is believed.

In this particular operation, the trees that were removed have all been replanted in other parts of the grove. This has been an interesting operation and will be reviewed briefly here.

The trees to be removed are first "buckhorned" and then pushed and lifted out with a bulldozer equipped with a rake blade. As soon as the tree is lifted out by the bulldozer a tractor equipped with a crane takes the tree and holds it suspended while all ragged roots are pruned off. Five such trees are loaded on a tractor-trailer outfit and taken to the new location. The trees are set in with 175 gallons of water and whitewashed immediately with a concrete paint-type durable whitewash. The trees are watered once a week if ample rain does not occur.

This operation has proven to be extremely successful. Here are the costs:

"Buckhorning,whitewashing, wound dressing on cuts, brush disposal, etc. (See under "Topping" in Section 3 for details) $10.40

4 men 9 hours to move and set 15 trees — 2.4 men hours per tree.

Bulldozer 10 minutes to dig tree and refill hole. Tractors and sup-

**Table I**

**Grove A**

Effect of Hedging on Percent of Pack-Out on Several Representative Groves

| Tangerine /RL Age: 30 | | Lakeland Fine Sand Planted 26 x 26 | |
|---|---|---|---|
| | Picked (Boxes) | Packed (Boxes) | %Pack-out |
| 1949-50 | 6087 | 2207 | 36.25 |
| | Hedged on 2 sides in Feb. '50 | | |
| 1950-51 | 3564 | 3005 | 84.31 |
| 1951-52 | 7908 | 6588 | 83.31 |
| 1952-53 | 3970 | 3570 | 89.92 |
| 1953-54 | 8634 | 5024 | 50.81 |
| | Hedged on 2 sides April '54 | | |
| 1954-55 | 3992 | 3366 | 84.31 |
| 1955-56 | 6171 | 5073 | 82.20 |
| | Hedged on 2 sides Jan. '56 | | |
| 1956-57 | 3422 | 2373 | 69.34 |
| 1957-58 | 816(Freeze) | 478 | 58.57 |
| | | 8-Year Avg. | 75.34 |

**Grove B**

| Hamlin / RL Age: 21 | | Eustis Fine Sand Planted 20x20 (Diamond) | |
|---|---|---|---|
| 1949-50 | 2307 | All Cannery | 0 |
| 1950-51 | 2125 | 1197 | 56.33 |
| 1951-52 | 2663 | 1800 | 67.59 |
| | Hedged on 2 sides Feb. '52 | | |
| 1952-53 | 2518 | 657 | 26.09 |
| 1953-54 | 2763 | 1672 | 65.13 |
| | Hedged on 2 sides Jan. '54 | | |
| 1954-55 | 1995 | 1338 | 67.06 |
| 1955-56 | 1445 | 1068 | 73.90 |
| 1956-57 | 1971 | 1132 | 57.43 |
| 1957-58 | 2609 (Freeze) | 1280 | 49.05 |
| | | 6-Year Avg. | 56.44 |

**Grove C**

| Duncan Gft/RL Age: 19 Years | | Lakeland Fine Sand Planted 28 x 28 | |
|---|---|---|---|
| 1953-54 | 1142 | 259 | 22.66 |
| 1954-55 | 1997 | 1166 | 58.39 |
| 1955-56 | 2975 | 1451 | 48.77 |
| | Hedged 3 sides in Feb. '56 | | |
| 1956-57 | 2497 | 1284 | 51.42 |
| 1957-58 | 3006 | 1680 | 55.88 |
| 1958-59 | 2904 | 1079 | 37.22 |
| | | 3-Year Avg. | 48.10 |

Figures: Courtesy Lake Region Packing Assn.

**Table II**

**Grove A**

Yield Records Before and After Tree Thinning Hamlin Oranges on Rough Lemon Rootstock

Planted in 1937

Soil Type: Rolling Phase of Lakeland Fine Sand

| Planting Distance Before Tree Thin. | Planting Distance After Tree Thin. |
|---|---|
| 15 x 25 | 25 x 30 |
| Tree Count 1170 | Tree Count 598 |
| Yield in Field Boxes | |
| 1950 - 4476 | 1955 - 2886 |
| 51 - 5634 | In January alternate |
| 52 - 6400 | trees removed |
| 53 - 6679 | 56 - 3858 |
| 54 - 5084 | 57 - 4349 |
| | 58 - 4255 |

Figures: Courtesy Lake County Grower.

ply units used about 4½ of the 9 hours.

Tractors without drivers about $2.00 per hour.

Supply unit with driver about $2.00 per hour.

Bulldozer 5 minutes to dig hole to set tree.

| | |
|---|---|
| Cost per tree: From above | $10.40 |
| Labor | 2.40 |
| Tractor & Supply Unit | 1.80 |
| Bulldozer | 1.00 |
| Grand Total | $15.60 |

3. Topping ("buckhorning") is here used to refer to a type of rejuvinating pruning. It describes the method used to revert an old block of low production seedlings to a much greater production without removing any of the trees. It involves the removal, in this case, of all wood from about 5 to 5½ feet above the ground. Some trees were cut at ground level. This type of severe pruning results in sufficient loss in wood and foliage to stimulate new growth over the remaining portion of the tree.

**Table III**

Production Record of a 10-acre Seedling Block Cut Back to Waist Height

| | Boxes | Boxes |
|---|---|---|
| Before | 1946 - 3017 | 1953 - 397 |
| cutting | 47 - 2652 | 54 - 722 |
| back | 48 - 2801 | 55 - 1120 |
| Trees | 49 - 2399 | 56 - 1503 |
| Cut | 50 - 1862 | 57 - 2926 |
| Back | 51 - 958 | 58 - 4872 |
| these | 52 - 385 | |

Figures: Courtesy Lake County Grower.

In many seedling blocks limbs have so overlapped that insect and disease pests together with a lack of sunlight in the lower part of the trees has resulted in a gradual dying of the lower limbs. In some old seedling groves it is 10 to 15 feet from the ground to the first limb. The tops are sparse, the foliage small, production is down and picking costs (usually from a 40-foot ladder) are decidedly up.

In the seedling block referred to here the trees are "Buckhorned" in solid blocks. A power saw is used and the cuts are made at the height most convenient for the saw operator. This is generally in the 5 to 5½ foot range. All cuts are treated with a heavy coat of water emulsifiable asphalt paint. The trunks are whitewashed immediately with a durable, waterproof cement paint. The brush is pushed out with a bulldozer and burned.

Within six weeks trunks are sprouting vigorously. All sprouts except the uppermost 3 or 4 on each large stub are rubbed off. This forces all growth into the top of the stubs and reduces the amount of decay that would subsequently occur if the lower branches were allowed to grow.

The growth near the stubs on the stump is very thorny. Terminal growth on the ends of the new growth is broken off by hand or cut by sickle at intervals to force the new growth to branch out and make a full headed tree quickly. The thorns continue to appear on the new growth and are so severe that inside pruning or training is impossible. Nature provides her own pruning for these trees as many branches are shaded out as the tops become more full and dense.

As the new growth gets older and longer the thorns begin to disappear in those parts of the tree.

Trees that are cut off at the surface of the ground grow out very rapidly also. They are more "squatty" than those cut higher. These trees as well as those cut off at 5 to 6 feet high grow back resembling budded trees. Trees cut from 10 to 15 feet above the ground assume the appearance of seedlings. The reason for not adopting the procedure of cutting the trees at the ground surface is that in such cases a large stump diameter exists much of which will eventually rot out regardless of the care exercised in the subsequent management of the stumps after cutting.

It took 5 years in this grove for trees to reach commercial production after topping.

**Cost Per Tree**

Saw twice (with Chain Saw, then Reciprocating Saw to "finish" cut) 2 men, ½ hour, 1 man hour

Whitewash 1 man, ¾ hour, ¾ man hour

Wound dressing 1 man, ½ hour, ½ man hour

Cost of whitewash (durable cement) .50 per tree

Cost of wound dressing .15 per tree

Haul brush (500 ft. from grove) 4 trips per tree, 1 hour, man and tracter ($2.00 per hr.)

Trees are pruned twice a month for first year to force sprouts out as near the end of the limb as possible

Cost per month, ½ man hour per month

Tall sprouts should be topped to prevent wind damage and encourage branching.

Total cost at $1.00 per hour for labor, $10.40

See Table III for yield records.

4. Close Spacing and Subsequent Thinning

Per acre production of citrus fruits is increased in almost direct proportion to the number of trees set in a grove. This relationship generally exists until such time as trees begin to become crowded provided ample fertilizer, moisture and pest

(Continued on page 10)

**TABLE IV**
**ORANGE PRODUCTION**
**AT TWO SETTING DISTANCES, 25'X30' AND 15'X25'**

| Age of Tree | Average Yield 25'x30' | Average Yield 15'x25' | Total Yield 15'x30' | Total Yield 15'x25' | Age Group | Cumulative Yield 25'x30' | Cumulative Yield 15'x25' |
|---|---|---|---|---|---|---|---|
| 5 to 9 | 79 | 158 | 395 | 790 | 5 to 9 | 395 | 790 |
| 10 to 14 | 135 | 270 | 675 | 1350 | 5 to 14 | 1,070 | 2,140 |
| 15 to 19 | 178 | 310 | 890 | 1550 | 5 to 19 | 1,960 | 3,690 |
| 20 to 24 | 221 | 310 | 1105 | 1550 | 5 to 24 | 3,065 | 5,240 |
| 25 to 29 | 264 | 300 | 1320 | 1500 | 5 to 29 | 4,385 | 6,740 |
| 30 to 34 | 299 | 280 | 1495 | 1400 | 5 to 34 | 5,880 | 8,140 |
| 35 to 39 | 341 | 255 | 1705 | 1275 | 5 to 39 | 7,585 | 9,415 |
| 40 to 44 | 386 | 220 | 1930 | 1100 | 5 to 44 | 9,515 | 10,515 |
| 45 to 49 | 434 | 180 | 2170 | 900 | 5 to 49 | 11,685 | 11,415 |

ESTIMATED ORANGE PRODUCTION ON SETTING 15'x25' WITH ALTERNATE TREES PRUNED TO MAKE ROOM FOR REMAINING TREES, WITH STUMPS REMOVED AT APPROXIMATELY 40 YEARS OF AGE, LEAVING TREES 30'x25'.

| Age of Tree | 30'x25' Trees | Alternate Trees | All Trees | Total Yield | Age Group | Cumulative Yield Combined | Cumulative Yield 15'x25' | Cumulative Yield 25'x30' |
|---|---|---|---|---|---|---|---|---|
| 5 to 9 | 79 | 79 | 158 | 790 | 5 to 9 | 790 | 790 | 395 |
| 10 to 14 | 135 | 135 | 270 | 1350 | 5 to 14 | 2,140 | 2,140 | 1,070 |
| 15 to 19 | 178 | 135 | 313 | 1565 | 5 to 19 | 3,705 | 3,690 | 1,960 |
| 20 to 24 | 221 | 125 | 346 | 1730 | 5 to 24 | 5,435 | 5,240 | 3,065 |
| 25 to 29 | 264 | 100 | 364 | 1820 | 5 to 29 | 7,255 | 6,740 | 4,385 |
| 30 to 34 | 299 | 75 | 374 | 1870 | 5 to 34 | 9,125 | 8,140 | 5,880 |
| 35 to 39 | 341 | 35 | 376 | 1880 | 5 to 39 | 11,005 | 9,415 | 7,585 |
| 40 to 44 | 386 | 0 | 386 | 1930 | 5 to 44 | 12,935 | 10,515 | 9,515 |
| 45 to 49 | 434 | 0 | 434 | 2170 | 5 to 49 | 15,105 | 11,415 | 11,685 |
| | | | | 45-year Average | | 336 | 254 | 260 |
| Deficit as compared to combined group, 5 to 49 years | | | | | | — | 3,690 | 3,420 |
| Relative yield over period with combined group as 100 | | | | | | 100 | 76 | 77 |
| Relative yield 5 to 39 years with combined group as 100 | | | | | | 100 | 86 | 69 |
| Deficit as compared to combined group, 5 to 39 years | | | | | | — | 1,590 | 3,420 |

Data from studies of the Florida Agricultural Extension Service and Experiment Stations, Gainesville, Florida, combined with estimates.
ZS /ep 1/7/59 - 400

The above information prepared by Zach Savage, Agricultural Economist, Florida Agricultural Experiment Station.

## MANAGING AND CARE OF YOUNG CITRUS TREES

(Continued from page 4)

satisfactory. However, the most desirable formula should contain only adequate amounts of all the elements essential to good tree growth and not excessive amounts of any element. Nitrogen and potassium are, by far, the most soluble nutrients and are rapidly leached from the limited root zone of newly planted trees. Consequently, they are required in larger amounts than the less soluble nutrients which tend to accumulate and remain available in the root zone.

"The following ratio of elements will satisfy the requirements of young, non-bearing citrus trees under most conditions: N-1, $P_2O_5$-1/4, $K_2O$-1, MgO-1/2, MnO-1/16, CuO-1/32, $B_2O_3$-1/100. The elements in this ratio and order can be made into a fertilizer mixture such as 8-2-8-4-0.5-0.25-0.1. Higher analysis mixtures are generally more economical and may be used, but the difficulty of obtaining uniform applications around the root zone is increased. **Extreme care should be taken to avoid root damage due to excess salt concentrations in localized areas brought about by uneven distribution.**

A suggested schedule of fertilization for a grove planted during the dormant season is given in Table 2 (of Bulletin 536A which we will pass out). The rate and number of applications of fertilizer should be based primarily on age and condition of the tree. Trees should be fertilized about 6 to 7 weeks for the first year. The frequency of application may be reduced in succeeding years.

"Rate of application the first year should be relatively low because of the limited root system of the tree, but should be increased sharply the next few years. Spread fertilizer in a 30-inch circle the first year, usually in the bottom of the water ring. Avoid putting fertilizer against the trunk.

"After the first year, the fertilized area should be steadily enlarged each application. A good rule to follow is to cover an area twice the diameter of the tree canopy. Thus, for a tree with a 3-foot canopy, apply the fertilizer uniformly over a circle 6 feet in diameter. Fertilizer applications should be omitted between October 1 and February 15 for the first year or 2 to reduce the possibility of inducing untimely growth flushes in the winter.

"On acid soils an application of dolomite or high calcium limestone should be made before or shortly after planting, either uniformly at the rate of 1 ton per acre, or at about 10 pounds in a 10- or 12-foot circle around each tree. One application by either of these methods will give sufficient pH control for the first 5 or 6 years, after which the pH should be adjusted to 5.5-6.5 annually as for mature trees.

"The emphasis the first 5 years should be on making good tree growth, and the quality of the crop should be secondary. From about the sixth to tenth years the trees come into appreciable commercial bearing but still benefit from a complete fertilizer. During this period it is time to begin the shift to a program for bearing trees. This would include changing from hand to machine applications of fertilizer.

"When a mechanical spreader is first used, it is desirable to drive close to the trees, using a 1-side spread such that only a swath of 10-12 feet down the tree row is fertilized. After 1 or 2 years of this, the fertilizer can be spread uniformly over the whole grown area except for the water furrows of bedded groves. This provides an over-all application of phosphorus for improved cover-crop growth and fortifies the soil with manganese and copper. Use 3 applications per year at the rates indicated in Table 2. From the eleventh year on, follow the program for full bearing trees given in the first part of this bulletin.

"In most cases it is advisable to supplement the fertilizer applications with nutritional sprays containing zinc. Make 1 application each year using 3 pounds of zinc sulfate plus 1 pound of hydrated lime per 100 gallons or its equivalent in neutral zinc material. On calcareous soils, or wherever symptoms of manganese and copper deficiencies appear, the nutritional spray should also contain manganese and copper. These may be supplied by adding 3 pounds of copper sulfate, 3 pounds of manganese sulfate and 1.3 pounds of lime or equivalent amounts of neutral materials to each 100 gallons of spray."

### V. COVER CROP

Unfortunately, this is an important area in which there has been practically no research. Growers generally agree that some type of cover crop should be grown during the summer months because they shade the soil and add organic matter to our sandy soils which are extremely low in organic matter.

We believe strongly in cover crops because they add bulky material to the soil that tends to increase the water holding capacity; they increase the buffer capacity of the soil; they retard erosion; and they tend to reduce sand blast in the winter and spring in instances where they are properly managed.

No ideal grass or legume cover crop can be recommended. The best seems to be hairy indigo. Next is crotalaria, and then comes our native grasses and weeds. They all produce oragnic matter and shade.

It seems that the best cover cropping system is to plant the grove area to indigo (using six to eight pounds of seed per acre) one year prior to planting. This **should** come up as a volunteer crop thereafter. In years of good rainfall it should be chopped or disced in July and a second crop allowed to come up and mature by November 1. Then it must be chopped sufficiently not to be a fire hazard nor to impede air drainage but yet causing as heavy a mat on the soil surface as possible to reduce wind erosion.

### VI. CULTIVATION

This is another area where research is lacking and successful grower practices take precedence. Young trees are customarily cultivated along the rows in relatively

narrow bands during the summer months of the first 3 or 4 years. This prevents the cover crop from encroaching on the young trees and competing for moisture and plant food. The cover crop in the middles should be chopped or disced down in the fall to prevent impeding drainage of the cold air but also leaving a coarse mat in the topsoil to prevent wind damage.

A new and most effective tool—when properly used—is the tree hoe, but a poor or inexperienced operator can do far more damage with a tree hoe than the weeds can do. The operator should be closely supervised to keep him from scarring the trunks of the trees.

**VII. PRUNING**

This is not a big item with young citrus trees. Rubbing off suckers below the scaffold limbs during the first few months after planting and trimming a few ill-shaped trees to make them have better conformation is sufficient. During the third or fourth year the young trees will require a certain amount of trimming or skirting, and this will be all the pruning necessary unless some adversity causes dead wood to appear.

**VIII. SPRAYING**

There is no set or recommended spray program for young trees, and not too long ago it was considered a waste of time to spray young trees. We know that this is penny-wise and pound-foolish. There are a number of insects and other reasons why young citrus trees actually need occasional sprayings.

First, under the new system of growing trees, for the first three or four years the objective is to produce as much vegetative growth as possible. This makes larger trees capable of bigger crops during early years. To obtain this objective we have found nutritional sprays very beneficial. Also there is a very practical need to control orange dogs, scale insects of various kinds, rust mites, spider mites, and greasy spot.

Two sprays per year properly timed will usually do this, but there may be times when additional applications will be very beneficial.

When trees reach their fifth year, they should be bearing their first commercial crop of fruit and should be placed on the regular program for bearing trees.

**IX. BANKING**

Banking is a most important factor that many growers were beginning to become lax about. Unfortunately the adverse winter two years ago taught again the value of good high banks. Young trees should be banked by November 15 and unbanked as soon as possible after the passing of dangerous cold weather—usually around February 15.

In closing let me remind you to pick up your copy of Bulletin 536A. It contains the current fertilizer recommended for both bearing and non-bearing groves.

---

## PLANTING AND THINNING PRACTICES FOR MAXIMUM PRODUCTION . . .

(Continued from page 7)

control measures are maintained in the grove.

As has been previously pointed out, growers recognize the value of close spacing of trees, but generally they delay any sort of thinning operation until production is actually being reduced by the reduction of bearing surface.

Hedging, thinning and topping have been mentioned as possible solutions to the problem of crowding. Another possible solution to this problem has been suggested and is being used on a trial basis by a number of growers.

This newer practice suggests the close spacing of trees, say 15' x 25'. As the trees begin to grow together, the alternate trees in the row are hedged just enough to leave a frame of light around the tree. This proceedure is followed each year. A light hedging job is done on the same alternate trees. Only enough hedging is done each time to create a "frame of light" around the tree. All hedging operations each year are continued only on the alternate trees in the row. Half of the trees are never hedged. By the time that the alternate trees are hedged to their trunks they no longer have a bearing surface worthy of consideration and there is no mental anguish on the part of the grower in removing them.

During the years that this operation is progressing the grove is giving maximum yields and ultimately the spacing of the large trees is 25 x 30.

Another advantage of the "frame of light" around the alternate trees is that air drainage will be improved thruout the grove.

Zach Savage has prepared some figures which show the relationship between yields of trees planted at 20 x 30, 15 x 25 (alternate trees not hedged) and 15 x 25 with alternate trees hedged. His figures are shown here:

**Conclusion**

1. Growers generally follow the practices of close spacing of trees to attain maximum fruit production.

2. High production is actually attained generally only as long as the branches of one tree are not interlocked with those of its neighbor.

3 Any one of several practices including hedging, thinning and topping, has improved production and quality of fruit in the groves studied.

4. Hamlin groves recovered their production levels more quickly than Valencias following thinning operations in the groves studied.

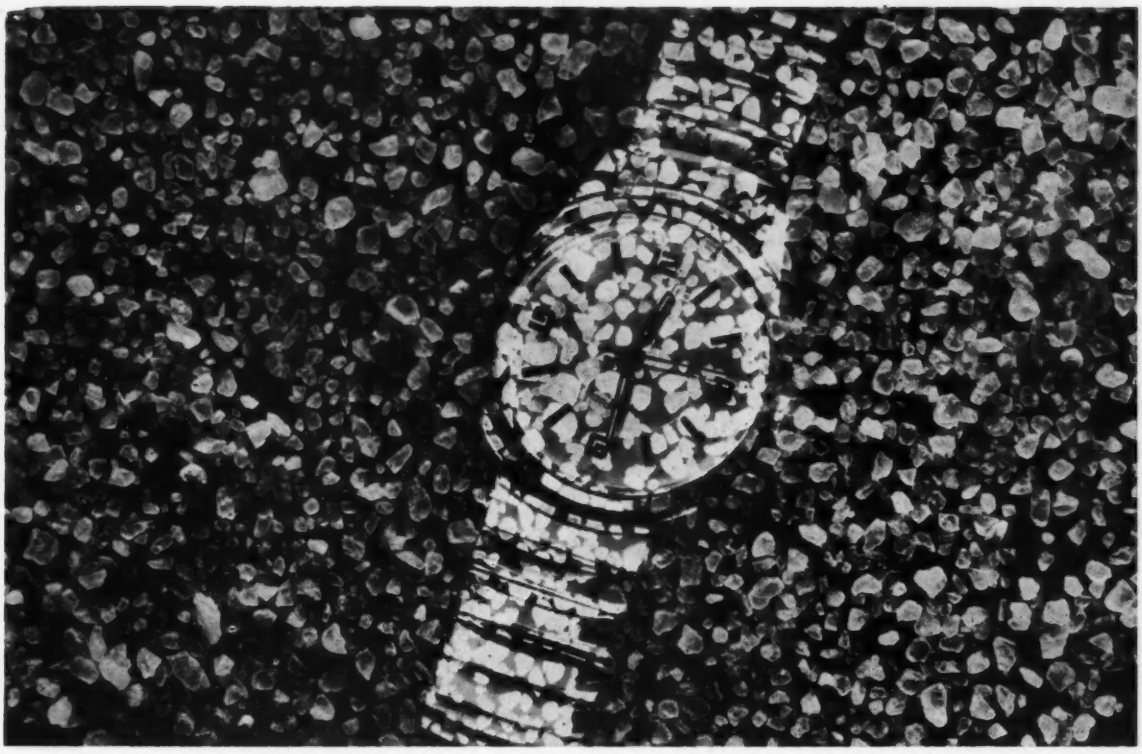
5. 27-year old Valencia trees on rough lemon rootstock have been transplanted bare-rooted very successfully by pushing and lifting the trees with a bulldozer and setting them in the new location in a similar soil type. The proceedure has not been as successful in moving trees of the same age and variety on sour orange rootstock.

6. Recovery of transplanted budded Valencia trees is very rapid as is the recovery of topped (buckhorned) seedling trees, but the budded trees resume fruit production much more quickly.

7. It is acknowledged that the data herein presented is too limited to be of practical value. It does, however, fairly illustrate the trends observed by field study of groves receiving the various treatments described.

---

Florida bees produced 15.6 million pounds of honey in 1958 with a value of almost $3.0 million. Florida is third in total production and value of honey produced.



# SUL-PO-MAG is granular... times itself to release magnesium as trees need it

There are several ways to give your citrus trees needed magnesium. Some sources dissolve too fast and leach out of the soil too soon. Others require chemical action in the soil before they become useable. But Sul-Po-Mag times itself just right to give your trees a lift *when they need it* . . . and it stays in the soil to give you season-long protection.

Sul-Po-Mag is granular. It dissolves at a controlled rate because less total surface area is exposed. Sul-Po-Mag is water soluble . . . it doesn't have to wait for acids from soils and roots to make it available. Early in the season . . . late in the season . . . Sul-Po-Mag is ready when needed.

Give your citrus trees the magnesium protection they need. Help them produce healthy growth for improved fruit quality and yields with water soluble double sulphate of potash-magnesia.

Ask for it by name. Get Sul-Po-Mag in the mixed fertilizers you buy. See why it's your best season-long insurance for top-picking yields.

S·P·M PREMIUM

Quality fertilizer containing a combination of readily available magnesium and sulphate of potash obtained from Sul·Po·Mag®

(DOUBLE SULPHATE OF POTASH & MAGNESIA)

Reg. Trade Mark IMC Chem. Skokie, Ill.

Look for this identifying Seal of Approval when you buy. It's your assurance of extra-value fertilizer.

INTERNATIONAL MINERALS & CHEMICAL CORP.
Dept. FGR-42, Skokie, Ill.

Please send me a free copy of your "Magnesium" Booklet which discusses magnesium and Sul-Po-Mag for specific crops.

NAME .....

ROUTE .....

TOWN ..... STATE .....

International Minerals Chemicals — Producers of Living Minerals

AGRICULTURAL CHEMICALS DIVISION 42-59

**INTERNATIONAL MINERALS & CHEMICAL CORPORATION**

*Administrative Center: Skokie, Illinois*

## ACL President To Address Growers Convention...

W. Thomas Rice, Wilmington, North Carolina, President of the Atlantic Coast Line Railroad, will be keynote speaker for the 16th Annual Convention of the Florida Fruit and Vegetable Association at Miami Beach on September 23, according to an announcement by J. P. Harllee, Jr. Palmetto, General Convention Chairman.

Rice

"Mr. Rice has accepted our invitation to make the keynote address at the coming convention and will speak on the subject of 'Agriculture at the Crossroads.' Mr. Rice is a noted speaker and his address will be factual and of great interest to this convention," said Harllee.

"After attending the public schools in Westmoreland County, Virginia, where he was born, he entered Virginia Polytechnic Institute in September, 1930, and was graduated in June, 1934, with a BS degree in civil engineering.

"Following graduation, he entered the service of the Pennsylvania Railroad in the Operating Department and held several positions before being called to active duty with the Army of the United States in 1942 as a first lieutenant. He served three years overseas in the European and Asiatic Theatres, attaining the rank of Lieutenant Colonel, and returned to the United States in December, 1945. Among his assignments while overseas was command of a portion of the Iranian State Railway.

"During his foreign service, Mr. Rice was awarded the Legion of Merit with oak leaf cluster. He is now a Major General in the Army Reserve Corps, serving as Director General, Transportation Railway Service, and is also Civilian Aide to the Secretary of the Army for the State of Virginia.

"Following his return to civilian life, Mr. Rice entered the service of the Richmond, Fredericksburg and Potomac Railroad in February, 1946. On September 1, 1946, he was appointed Superintendent of Potomac Yard; on July 1, 1949, Superintendent at Richmond; and on May 1, 1951, General Superintendent. On January 1, 1955, he was elected President of the Company and held that position until becoming President of the Atlantic Coast Line on August 1, 1957."

# PROGRAM

**THE FIRST FLORIDA CITRUS NURSERYMEN'S INSTITUTE**

**Florida Citrus Building (Mayo Hall)**

**WINTER HAVEN, FLORIDA**

**SEPTEMBER 24, 1959**

---

9:00 A. M.

Introductory Remarks. R. G. Pitman, Jr., President Florida Citrus Nurserymen's Association.

Introduction of William C. Cooper, Principal Horticulturist, U. S. Department of Agriculture, Crops Research Station, Orlando.

"Basic Research And Its Relation To The Florida Citrus Industry." Marion Parker, Director of Research, U. S. Dept. of Agriculture, Washington, D. C.

"The Importance Of Nursery Stock From The Standpoint Of The Production Manager." J. T. Griffiths, Production Manager, Snively Groves, Winter Haven.

INTERMISSION

"What Is The Ideal Citrus Nursery Tree For Florida?" Gerald G. Norman, Supervising Inspector, State Plant Board of Florida Citrus Budwood Registration Program.

"California Stock Foundation Programs For Citrus." L. G. Weathers, Pathologist, University of California, Riverside.

LUNCHEON — 12:00-1:30 P. M.

"California Nursery Practices." Albert Newcomb, W&N Ranch, Thermal, California.

"Disease Problems With The Murcott." W. Conway Price, Virologist, Citrus Experiment Station, Lake Alfred.

INTERMISSION

"Nursery Equipment And Techniques." George Nordmann, West Volusia Nursery, DeLand.

"Looking Ahead In The Nursery Business." Fred P. Lawrence, Citriculturist, Agricultural Extension Division, University of Florida.

ADJOURNMENT

## CONNER INDICATES PROFITABLE SEASON AHEAD FOR CITRUS

Florida Citrus Mutual President Vernon L. Conner today said all price determiners "indicate a profitable season ahead for oranges, grapefruit and tangerines."

Conner, speaking at the 26th annual Citrus Institute at Camp McQuarrie in northeast Lake County, said the expected production of Florida oranges is much more favorable than it was last year at this time, principally because of ideal growing conditions since the bloom.

"Fresh fruit shipments of oranges this next season will increase substantially," he said. "The use of oranges for frozen orange concentrate will decrease in proportion to the over-all total as compared to this season."

"So, next season we can look forward to a more in-balance position in the utilization of oranges," Conner said. "This is healthy; this is needed; this is going back to a more normal marketing situation."

Conner said grapefruit production prospects are "not nearly as good as oranges."

"In other words, it looks as though we will have less grapefruit this coming season than we have just finished marketing, but inventories of grapefruit juice and sections are in a favorable position," he said.

As for tangerines, Conner said they will "probably be easier to move than in many past seasons because of growing conditions."

Conner complimented the concentrate industry on their recent announcement of a supplemental advertising program to help move the present concentrate inventory.

"With this added promotion, Florida Citrus Mutual expects more than ever that the concentrate inventory at the end of the season will be about 14 million gallons," he said.

Conner reviewed the basic purpose of Florida Citrus Mutual and presented a long range program for the coming season.

He said the purpose of having Mutual is that "a growers' organization is essential for the stability of the industry and forceful representation for the grower."

## CITRUS PROCESSORS WILL MEET SEPT. 15

The 10th annual citrus processors' meeting at the Citrus Experiment Station has been scheduled for September 15.

The annual meeting is held primarily to present results of experimental work to management and quality control of the citrus processing plants.

While not complete, the program is expected to include discussions of pulp washing, application of vapor-phase chromatography to citrus research, physical stability measuring procedures for frozen orange concentrate, and recent research on promising citrus by-products.

## FARM CREDIT TO BE DISCUSSED AT FFV CONVENTION SEPT. 25

The president of the Federal Intermediate Credit Bank of Columbia, South Carolina, will be a guest speaker at the 16th Annual Convention of the Florida Fruit & Vegetable Association at Miami Beach, on September 25.

R. A. Darr

Robert A. Darr, who was born and reared on a farm in Iredell County, North Carolina, has had broad experience in farm credit. In 1934, he became secretary-treasurer of the Statesville Production Credit Association in North Carolina.

In 1937, he was secretary-treasurer of the Greenville, North Carolina Production Credit Corporation of Columbia, then vice-president and secretary, and in 1951 was elected president of the organization.

In 1954, he was elected president of the Federal Intermediate Credit Bank of Columbia, which position he now holds.

# Refrigerated Warehouse Practices . . .

(Concluded From Last Issue)

* * * * * *

The respiration rate of grapefruit varies considerably, the average rate being near the rate of a tree-ripe lemon.

**Storage Of Packed Florida Oranges**

During the last few years the United States Department of Agriculture has been conducting investigations on the storage and keeping quality of Florida Valencia oranges. Some of these studies have been on the basis of carlot tests, with the Refrigeration Research Foundation and Florida shippers cooperating in the project. The fruit was successfully stored at terminal warehouses at Providence, R. I., and New York, for periods of 8-12 weeks at 32 F.

Care should be exercised in the selection of the crop of fruit for storage. It should be in prime condition and should not be picked too early in the season. On the other hand it should not be held on the tree until soft and overripe.

Emphasis should be placed on careful grading, with soft, overripe, creased, split, and bruised fruits sorted out. Tests show some beneficial control of decay in storage by the color-added treatment. But frequently, this treatment is too severe and causes high percentage of fruit with burned stems. The color often fades and the appearance of the fruit is spotty and unattractive.

Fairly good control of decay in storage can be accomplished by packing-house chemical treatments such as sodium orthophenylphenate plus hexamine. The treatment was developed by Drs. E. F. Hopkins and K. W. Loucks of the Lake Alfred Citrus Experiment Station through the cooperative efforts of the Florida Citrus Commission.

Briefly, the treatment consists in submerging the fruits in a water solution containing 2% sodium orthophenylphenate, 1% hexamine, 0.05% Palmolive soap for two minutes. The effectiveness of this treatment is demonstrated by comparing the results on total decay of Valencia oranges stored for 12 weeks at 32 F and 1 week at 70 F. The figures are averages and based on storage tests at Orlando, Florida and New York City. The unwashed fruit or controls showed 11.9% total decay, while the Dowicide-Hexamine treated fruit showed only 3.8% total decay.

Further reduction of decay in Florida oranges has resulted from the use of diphenyl treated case liners, or diphenyl treated corrugated paper containers. However, it should be stated that the box liner and the corrugated paper containers interferes and slows down the process of cooling and that, therefore, additional precooling and refrigeration should be supplied to compensate for this.

There appears to be no short cuts in preparing fruit for successful long-time storage. The orange does not improve in quality during storage. Total decay can be greatly reduced by careful handling of fruit, good packing-house methods, chemical treatments, diphenyl treated liners or cartons, precooling, refrigerated tansit and low temperatures storage at about 32 F.

The rate of precooling is governed by the initial fruit temperature (assuming adequate refrigeration equipment is provided), and the temperature, volume, and uniform distribution of supply air.

Oranges precooled with air volumes above 1500 cfm per car, arrive on the market in better condition than warm fruit loaded directly into preiced refrigeration. The beneficial results derived by precooling diminishe as the air volume is reduced, and actual damage to the fruit occurs as the volume decreases below 1500 cfm per car.

The relative humidity of the air in the rooms during precooling has a direct relation to the weight loss and severe rind defects. Humidity is just as important as temperature in preventing grade and quality deterioration of oranges during precooling and shipment to the market. A high relative humidity can be maintained in precooler rooms without resorting to the use of auxiliary sprays and complicated controls, simply by using a sufficient air volume and the brine spray system.

The design and construction of a building for precooling and storage determines the operating practice and conditions that can be maintained. It is important to coordinate the engineering of the building with that of the refrigeration and air distribution system before construction of either is started.

Precooling may also be accomplished in the refrigerator car after it has been loaded. There are three different methods of car precooling, one by means of portable fans installed at the top opening of the bunker at each end of the car, using salt and ice in the bunker as a source of refrigeration.

The second method has stationary or portable regrigerating units, which force low temperature air into the car and around the fruit.

The third and the most satisfactory method is to precool the fruit in the cars in transit, by means of stationary fans permanently located under the floor racks at both ends of the refrigerator car.

The fans, which are operated from wheels of the car, deliver the air to the bottom of the ice bunkers, then up through the ice in the bunkers and out at the top opening of the bunker. The fans are operated mechanically when the car is in motion or by electric motor during stationary precooling.

**Storage**

Cold storage (39-40 F) at shipping point should be used only to keep an adequate supply of fruit on hand to carry over short periods of adverse weather conditions that hamper harvesting operations and otherwise would interfere with shipping schedules. Under ordinary circumstances several days' supply is sufficient. Long storage is never desirable as the consumers prefer fresh oranges whatever the geographic origin.

In contrast to many other fruits, oranges have a long harvesting season, and a moderately long life after picking, which can be extended somewhat by low-temperature storage. However, California oranges ordinarily deteriorate faster in storage than if left on the tree under

* * * * * *

"The article, 'Refrigerated Warehouse Practices', the first section of which was printed on pages 14, 15, 18 and 19 of the August issue, and subsequent issues of this publication, are reprinted by courtesy of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., from Chapter 25, 'Citrus Fruits', ASRE DATA BOOK 1959 edition.

* * * * * *

normal weather conditions. Under some conditions granulation, or hardening of the juice sacs, may also increase more rapidly in storage than on the tree.

The effect of storage on juice quality is variable. The ability of any individual lot of fruit to retain its original fresh flavor depends to a large extent upon its original acidity. The juice quality is closely associated with the ratio of total soluble solids to acid. As the acid decreases the juice tastes sweeter and eventually becomes flat and insipid. Fruit of low initial acidity may not lose more acid than one with high acidity but the change in flavor will be much greater. Slightly off, or stale flavors are also more rapidly detected in juices of low acidity.

During storage or shipment under the most favorable conditions the juice content of oranges decreases at the rate of about one per cent per week. Under less favorable con-

ditions which have a tendency to increase the rates of respiration and transpiration, the nutritional loss will be greater.

After they have been packed, oranges are transferred to the precooling rooms or to refrigerator cars by hand, power driven trucks or conveyors. In the cars they are loaded flat with a chimney type load. If transferred to the precooling rooms they may be stacked on the floor or on pallets suitable for power trucks. In stacking on the floor or on pallets, its is important that space between pallets and containers be sufficient to allow uniform distribution of air.

After the room has been filled, the fruit is cooled rapidly to the desired storage temperature, after which the air volume is reduced to approximately 1,200 cfm per car, and held at this value until the fruit is removed from the room. The temperature of the supply air entering the room should be not more than 2 F below the selected storage temperature of the fruit.

Considering all the factors that influence storage life, it becomes apparent that the maximum storage life is not always predictable unless all adverse factors can be recognized and taken into consideration. To give consumer satisfaction, California oranges should have at least two additional weeks' storage life remaining when unloaded at the market.

**Precooling Process**

In the citrus industry, precooling is used for oranges but not for lemons and grapefruit. Precooling means the rapid removal of the internal heat of the orange as soon as it has been processed and packed for shipment. One reason for precooling is to improve the keeping qualities of the fruit. The other is to save ice during transportation to market in railway refrigerator cars. If storage is necessary because of unfavorable market conditions, the oranges are precooled at about 38 F. Precooling should always be carried below 50 F, but never lower than 6 F.

It is not recommended to use supply air temperatures below 32 F due to the danger of freezing injury since oranges freeze at about 28 F. Best results are obtained with supply air temperatures from 32-34 F. A minimum of 1500 cfm of supply air per carload (approximately 34,000 lb. of fruit) should be provided, but much better results are obtained with 3000 cfm per carload. With low air quantities, auxiliary humidification with humidistat control should be provided in the precooling rooms to maintain 85% rh. Average precooling time is about 72 hr, obtained with 1,500 cfm of 30 F air or 3,000 cfm of 34 F air per carload. For storage only after precooling, a supply air quantity of from 1,000-1,200 cfm per carload is sufficient.

The carbon dioxide content of precooling rooms should be kept below 0.2% by the introduction of fresh air. For normal fruit at 38 F storage temperature, 10 cfm per carload is sufficient. However, if the fruit is over-ripe or of low quality, it may be necessary to lower the carbon dioxide concentration to 0.1%.

A precooling plant should be designed with a maximum storage capacity of ten times the daily precooling capacity. Thus a five car per day precooler should have a total storage capacity of 50 cars. Allowing three days (72 hr) for precooling, there will be 15 cars in the precooling process each day. At 3,000 cfm per car, they will require 45,000 cfm supply air. Assuming rooms of five carloads capacity each, there will also be one room being loaded preparatory to precooling and one being unloaded after precooling. This makes a total of 25 cars in process leaving 50-25, or 25 cars in storage under maximum load conditions. At 1,000 cfm per car, the storage rooms require 25,000 cfm supply air. Thus the plant will require an air handling system of 45,000+25,000, or 70,000 cfm total. At least five precooling rooms of five cars capacity each, plus a 25-car storage room will be required. The usual design would be to have 10 rooms, each of five cars capacity, so that the fruit would not have to be moved from precooling to storage room. Each room would be used for either precooling or storage by varying the supply air quantity. Normally the fruit is held for an average of a week to 10 days under refrigeration before shipment.

**Load Calculations**

The heat gain through the exposed walls, floor and ceiling of the precooling of storage room is figured in the same manner that any refrigerating or air conditioning load is calculated from the exposed area, transmission coefficient and the temperature difference. Insulation should be four inches of corkboard or other material having an equivalent insulating value.

The heat gain from leakage through the insulation, infiltration, or outside air, fan motors, pump motors, etc. is calculated in the usual manner. To these heat gains must be added the cooling down load for the fruit precooled each day and the respiration load for all the fruit held in storage.

The fruit and the boxes should be considered separately as the former has a specific heat of 0.9 and the latter only 0.4. About 90+ of the cooling down load will be sensible heat and the remaining 10% latent heat.

Brine spray air washers, using a

## SENATOR CARLTON TO ADDRESS GROWERS

A Florida Citrus Breakfast will be one of the outstanding events at the 16th Annual Convention of the Florida Fruit & Vegetable Association at Hotel Fontainebleau, Miami Beach, on September 23, 24 and 25.

Sen. Carlton

State Senator Doyle E. Carlton, Jr. Wauchula, will be guest speaker at the breakfast which will be sponsored by Florida Citrus Mutual and the Florida Citrus Commission on behalf of the entire Florida citrus industry.

Senator Carlton, a farmer by occupation, has served three sessions in the Senate representing the 27th Senatorial Disrtict. His father, Doyle Elam Carlton, Sr., was Governor of Florida from 1929 to 1933.

Industry chairman for the breakfast will be Homer Hooks, General Manager of the Florida Citrus Commission, and master of ceremonies will be Robert W. Rutledge, General Manager, Florida Citrus Mutual. Plans for the breakfast were consummated when citrus industry leaders met with representatives of the Florida Fruit & Vegetable Association at Florida Citrus Mutual offices in Lakeland earlier.

central station system, are used to a great extent in orange precooling work. Such systems are probably the most successful and satisfactory, especially for large plants, although unitary systems with cooling units in each room are sometimes used. Either dry-coil or wetted-coil units may be used.

Because of the low temperature and high humidity, defrosting is a problem when using a dry-coil unit. Special defrosting means such as water defrost, hot discharge gas, or outside air duct connections must be provided. Wetted-coil brine spray units eliminate the defrosting problem but have the disadvantage of requiring frequent strengthening of the brine.

Brine spray air washers for this type of work must have special eliminators (with more bends than for water sprays) in order to prevent excessive brine carry-over. The air velocity through the washer should be from 500-750 fpm per sq. ft. of eliminator face area. The range of brine spray quantities varies from two-six gpm per sq. ft. of cross sectional area per spray bank.

Some designs call for one spray bank, but most designs use two spray banks to secure the highest possible degree of saturation. The brine temperature range may vary from 2-10 F. For ordinary calculations, the tons refrigeration capacity of a brine system may be obtained by multiplying the gpm circulated by the brine temperature range and then dividing by 28 i.e., 28 gal deg (1 ton refrigeration). The aid quantity usually runs from 1,000-1,500 cfm per ton refrigeration.

Calcium chloride or sodium chloride (salt) is used for brine, with sodium chloride most common in citrus work because of its cheapness. Both brines have a lower vapor pressure than water, and therefore have a drying effect on the air passing through the washer. Calcium brine has the lower vapor pressure and is the more drying.

There may also be a precipitation of $CaCO_3$ from the carbon dioxide in the air. Salt brine will give fairly high saturation due to the high air-brine ratio and the low sodium chloride concentration required. It is not possible to obtain complete saturation when dehumidifying, especially with a brine spray, but we may assume about 95% rh for the air leaving a two-bank washer.

Corrosion must be carefully guarded against with a washer system, and a pH value (hydrogen ion concentration) between 7.5 and 8.5 (a pH of 7.0 indicates a neutral brine) should be maintained for best results.

The refrigerant most commonly used in orange precooling work is ammonia. However, ammonia fumes are very injurious to citrus fruits, and precautions must be taken to eliminate leaks. It is most desirable to locate the ammonia compressors and all ammonia-containing vessels in a separate room or building, tightly closed off from the storage space.

Refrigerant 12 is a safer refrigerant to use for unitary systems with separate conditioners in each room, as this refrigerant is not injurious to the fruit. An indirect system using calcium chloride brine for the cooling units located in the precooler rooms makes the best unitary system when ammonia is the refrigerant.

With a central air washer, the brine may be cooled in a separate shell and tube brine cooler, or by direct expansion coils placed between the sprays in the air washer. Normally the refrigeration machine will be thermostically controlled from the brine temperature.

**Air Distribution**

The quantity of supply air should be based on 3,000 cfm for each car undergoing precooling, plus 1,000 cfm for each additional car in storage only. The temperature rise in the supply air should be small, say from 6-8 F at the beginning to 2 or 3 F at the end of precooling.

The amount of outside air is that required to keep the carbon dioxide generated by respiration to the desired minimum concentration for best keeping qualities of the fruit. The difference between the supply air quantity and the outside air quantity is, of course, the return or recirculated air quantity.

Wooden, Celotex, or masonry ducts are used in most cases instead of sheet metal which will sweat and rust in the temperature and humidity conditions of an orange precooling room. Smooth wooden supply ducts are ordinarily designed for a maximum velocity of 1,500 fpm at the fan with velocities tapering off in the branches to 800 or 1,000 fpm. For masonry ducts, lower velocities should be used, say 1,200 fpm maximum.

Dampers should be easily adjustable with positions marked for precooling and storage air quantities. Supply and return dampers should be connected so as to operate as a unit for each room. Damper areas should be based on not more than 1000 fpm air velocity. Dampers are

often made of wood. Metal dampers and metal transformation pieces or guide vanes, where required, should be protected with a heavy coating of bitumastic paint.

In precooling rooms, full height supply and return ducts often formed by false walls at opposite ends of the room. Openings provided near the floor, and another set near the ceiling. Dampers or adjustable slides over the openings in the supply chamber admit air to the room, and similar dampers are provided in the return chamber at the opposite end of the room.

The space over the corridor is often utilized for the main return duct. The boxes of oranges are stacked so that the bulge or crown leaves an air space in the direction of air flow from one end of the room to the other. Where practicable the ducts are run inside the refrigerated space to save insulation. Ducts which are not inside refrigerated rooms should be insulated with the equivalent of four inches of corkboard.

**Conclusion**

To engineer a refrigeration and air conditioning system properly for an orange packing plant, an understanding of the biological as well as the technological aspects is required. This paper has briefly outlined the methods used in California and Arizona for harvesting and packing oranges, stressing the necessity for quickly bringing the fruit under refrigeration to improve the keeping qualities. The life processes of the orange after picking have been described and the various factors necessary to make engineering calculations for sweat and precooling rooms have been outlined and illustrated with examples.

In the final analysis refrigeration for oranges is an air conditioning problem. In designing a plant, careful attention must be given to the following important factors: (1) air volumes, (2) air temperatures, (3) humidity (4) ventilation (5) air distribution (6) flexibility and (7) controls. Consideration of these factors, in the manner outlined in the text, should result in a properly designed refrigeration plant.

**Bibliography**


1. Addington, H. B.; Air Conditioning Problems in the Citrus Fruit Industry; Heating & Ventilating, p. 53-56, December 1937.
2. Agricultural Code of California; Bureau of Fruit and Vegetable Standardization; Calif. Printing Office, 1949.
3. Biale, J. B., Shepherd, A. D.; Identification of Acetaldehyde Among the Volatile Products of Citrus Fruits; Proceedings of Amer. Society for Horticultural Science, Vol. 37, p. 543-47, 1939.
4. Biale, J. B. Shepherd, A. D.; Respiration of Citrus Fruits in Relation to Metabolism of Fungi. I Effect of Emanations of Penicillium Digitatum, Sacc. on Lemons; Amer. Journal of Botany, Vol. 28, No. 4, p. 263-70, 1941.
5. Campbell, H.; Handling Raw Materials for Food Processing; Refrigerating Engineering, p. 428, November 1946.
6. Fawcett, H. S.; Citrus Diseases and Their Control; McGraw-Hill Book Co., New York, 1936.
7. Gay Engineering Corp. Bulletin; Gay Multidraft, Los Angeles, Calif., 199.
8. Grierson, W., Newhall, W. F.; Degreening Conditions for Florida Citrus; Proceedings of Fla. State Horticultural Society. Vol. 66, p. 42-46, 1953.
9. Grierson, W., Newhall, W. F.; Tolerance to Ethylene of Various Types of Citrus Fruit; Proceedings Amer. Society for Horticultural Science, Vol. 65, p. 244-50, 1955.
10. Grierson, W., Patrick, R.; The Sloughing Disease of Grapefruit; Proceedings of Fla. State Horticultural Society, Vol. 69, p. 140-42, 1956.
11. Haller, M. H., Rose, D. H., Lutz, J. M., Harding, P. L.; Respiration of Citrus Fruits After Harvest; Agricultural Research, Vol. 71, p. 327-59.
12. Harding, P. L., Soule, M. J., Sunday, M. B.; Storage Studies on Marsh Grapefruit—1955-56 Season. I Effect of Nitrogen and Potash Fertilization on Keeping Quality. II Effect of Different Temperature Combinations on Keeping Quality; USDA AMS-202, July 1957.
13. Harding, P. L., Wiant, J. S.; Terminal Market Storage of Florida Oranges; USDA, HT&S Office Report No. 218, 1949.
14. Harvey, E. M. et al.; Terminal Market Storage Tests on California Lemons; USDA, HT&S Office Report No. 238, 1951.
15. Hendrickson, H. M., MacRill, J. R.; Refrigeration of Lemons and Grapefruit; ASRE Refrigerating Engineering Application Data Section 18-R, July 1948.
16. Hendrickson, H. M., MacRill, J. R.; Refrigeration of Oranges in California; ASRE Refrigeration Engineering Application Data Section 17-R, September 1947.
17. Hopkins, E. F., Loucks, K. W.; The Dowicide A-Hexamine Treatment of Citrus Fruits for the Control of Mold and Stem-End Rot Decay; Citrus Magazine, p. 22-26, 1951.
18. Hopkins, E. F., Loucks, K. W.; Value of Dowicide A-Hexamine Treatment in the Cold Storage of Oranges; Citrus Magazine, p. 16-20, June 1956.
19. Hopkins, E. F., McCormack, A. A.; Effects of Ammonia Treatments in Fiberboard Cartons on the Stem-End Rot and Mold Decay in Florida Oranges; Citrus Magazine, November 1957.
20. Mann, C. W., Cooper, W. C.; Refrigeration of Oranges in Transit from California; USDA Agr. Bulletin 505, p. 86, 1936.
21. Mann, C. W., Gorman, E. A., Jr., Hukill, W. V.; Stage Icing in the Refrigeration of Oranges in Transit from California; USDA Bulletin No. 857, September 1943.
22. Newhall, W. F., Grierson, W.; A Low Cost Self Polishing Fungicidal Water Wax for Citrus Fruit; Citrus Magazine, March 1956.
23. Phillips, R. V., Grierson, W.; Advantages of Bulk Handling Citrus Through the Packing House; Proceedings of Fla. State Horticultural Society, Vol. 70 (in press) 1957.
24. Prosser, D. S. Jr., et al; Bulk Handling of Fresh Citrus Fruit; Fla. Exper. Sta. Technical Bulletin No. 564, 1955.
25. Rose, D. H., Cook, H. T., Redit, W. H.; Harvesting, Handling and Transporation of Citrus Fruits; USDA Bibliographical Bulletin No. 13, January 1951.
26. Rose, D. H., Whiteman, T. M., Wright, R. C. Commercial Storage of Fruits, Vegetables and Florists Stocks; USDA Circular 278, 1933 (now superseded by Handbook No. 66).
27. Storage of Florida Oranges; USDA HT&S Office Report No. 219, 1949.
28. Wiant, J. S., et al; Storage Tests on Florida Oranges; USDA HT&S Office Report No. 236, 1951.


## FLORIDA AG LEADER A. P. SPENCER DIED AT HOSPITAL RECENTLY

Arthur P. Spencer, former director of the University of Florida Agricultural Extension Service and long-time Florida agricultural leader, died here Monday, July 27, following a brief illness.

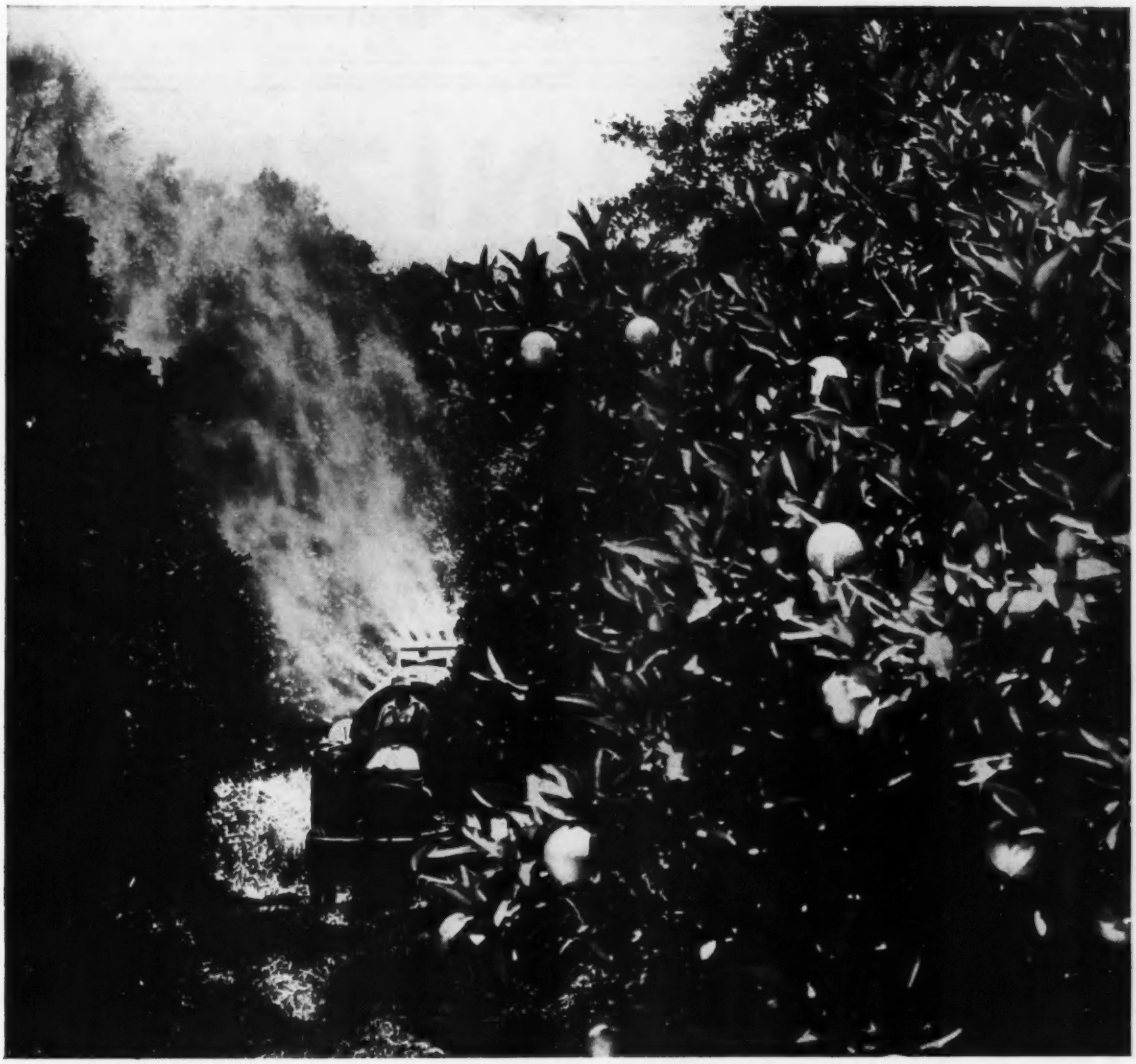
Spencer, who was 82, was a native of Canada and graduate of Virginia Polytechnic Institute. He first joined the Universtiy of Florida staff in 1910, as assistant in extension, and was the first person in Florida to hold a title in agricultural extension work.

Spencer was named district agent with the Extension Service in 1914. He helped set up the system of county and home demonstration agents that is now widely known throughout Florida.

In 1916 he became assistant director of extension, and in 1918 his title was changed to vice-director. He was made director in 1943.

Since his retirement in 1947, Spencer had been director emeritus. He was past master of the Gainesville Masonic Lodge and member of the First Presbyterian Church.

Spencer received numerous honors during his active career in agricultural extension work. He was president of the Florida Chapter, Epsilon Sigma Phi, extension workers fraternity, and in 1943 was awarded a certificate of recognition by the chapter.



# CONTROL ALL MAJOR CITRUS MITES WITH TRITHION®

No other miticide gives you the combination of advantages you get with TRITHION. It controls all citrus mites, even mite eggs; gives quick kill; and has long-lasting action. TRITHION can be used on bearing trees up to 14 days before harvest. It's available as a dust or spray. Ask your dealer for TRITHION, or write to Stauffer Chemical Company, Tampa, Florida, for further information.

Research, service and products of highest quality have made Stauffer one of America's largest specialists in farm chemicals. Look for and buy Stauffer brand INSECTICIDES, FUNGICIDES, WEED KILLERS, MITICIDES, SEED PROTECTANTS, FUMIGANTS, GROWTH REGULATORS, GRAIN PROTECTANTS, DEFOLIANTS.

Stauffer CHEMICALS SINCE 1885

®TRITHION is Stauffer Chemical Company's trade-mark (registered in principal countries) for O, O-diethyl S-p-chlorophenyl thiomethyl phosphorodithioate, an insecticide-miticide.

# The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

## Reports Of Our Field Men . . .

### HIGHLANDS AND POLK COUNTIES

**R. E. Lassiter, Jr., & R. S. Carlin**
**P. O. Box 1304**
**Winter Haven, Fla.**

It is still raining in this area, and growers in some of the low areas have been having to drain or pump water from their groves in order to try and prevent water damage.

In some blocks the rain has effected the desired control of Rust Mite after the sprays were applied. Growers should continue to be on the look-out for increased Rust Mite population. We are also noticing more live Red Scale to be present than we like to see at this time.

Growers should be chopping their cover crops where it is necessary. Cover crop growth has been good this summer, being helped along by good rainfall.

Young trees should be receiving ing their last application of fertilizer until next spring. In the colder areas it would be wise to with-hold the application of fertilizer to young trees after the last of August. This will give them ample time for tender growth to harden before the cold weather comes.

### SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

**C. R. Wingfield**
**Phone: Glandale 2-8181**
**Avon Park, Fla.**

Up to the present we have been having rains most every day and while in some locations it has been only showers other areas have had extremely heavy rains and no doubt has caused some damage to tree roots. This condition has upset routine spraying and cultivation. Cover crops are being worked down where possible and this will help to dry out the soil, however care should be taken to avoid deep cutting if soil is considerably wet.

The citrus trees are holding a good color and are putting on growth at regular intervals. Fruit sizes are generally good but some seedling, where heavily loaded, are needing a little extra nitrogen. Thinking towards the fall fertilizer application we can reasonably believe the more soluble elements will be very low and should be replaced in this application. Resets and nonbearing trees should receive their last feeding right away so that the growth can harden before possible cold weather.

The vegetable growers are still having a hard time getting their land ready for planting of the fall crops. Pepper, Cukes and Tomatoes will be planted as weather will permit. Impossible to estimate acreage at this time. A few days without rain could make a big change.

### HILLSBOROUGH PASCO AND SUMTER COUNTIES

**C. W. Dean**
**Gibsonton, Fla.**
**Phone Tampa 40-2592**

I find the weather very wet at this time. We have some damage to citrus in this area, most of it confined to the younger trees.

We still have some spraying with oil and zineb at this time. Most of the growers have completed their spraying. We should keep watch for rust mites and scales. Due to all the rain, we have had a hard time getting the proper kill.

Most of the fruit have sized wonderfully well. We have a fair to good crop in most groves. There are some groves that are light. As a whole though, the quantity is in most of them. That good Lyons Fertilizer has done it again.

### SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

**Eaves Allison**
**P. O. Box 365, Sarasota, Fla.**
**Phone Fulton 8-2611**

Five days of steady rain early in August on top of a rainy month and followed up by daily showers has stacked water up in this area. We can expect to see the effects of some root damage on many of the wetter groves within the next sixty days, or maybe sooner. Citrus should be web-footed for these here parts!

Texas and purple mite populations have been pretty fruitful in some locations, and soft brown and red scale have also been in evidence. Particularly on young stuff. Our new crop of fruit is looking good and the quality is tops. The quantity is also greater than we could see earlier in the year—but it is still below a normal heavy crop in many groves.

The fall vegetable plantings in this section are noticeable by their absence—but a few hardly souls are devoting some acreage to tomatoes, squash, beans and cabbage. This may be the year when they all wish they had planted in the fall. You never can tell!

# How To Raise Quality Fruit

## IRRIGATION

LOUIS W. ZIEGLER
Professor of Fruit Crops, Universit yof Florida

Presented at the 26th Annual Florida Citrus Institute.
Camp McQuarrie, Florida, Aug. 13, 1959

*Louis W. Ziegler*

* * * * * *

In 1947, Sites (1) stated that the years 1940-41 and 1942-43 were high-solids years and that 1941-42 and 1943-44 were low-solids years. The years of high solids were those of relatively low rainfall while those of low solids were those of higher rainfall. The year of highest solids in his study was that of 1940-41 which had the least rainfall.

Irrigation studies reported by Voorhees, Reitz, and Long (3), and by Sites, Reitz, and Deszyck (2), as well as those of the writer (4), were consistent in indicating that irrigation practices reduce the percentage of soluble solids in the fruit. Thus, this influence occurs whether the water is supplied through rainfall or through irrigation. Under any given set of circumstances there is an inverse correlation between the amount of water supplied and the soluble-solids content of the fruit in percentage. The high-solids year of 1940-41 had low rainfall during the June-September period which Sites considered of importance, low rainfall in the January-June period which seemed of importance to the writer, and also low total annual rainfall.

The percentage of soluble solids is influenced by so many factors, that it is impossible to predict it for a particular year upon rainfall records alone. As has been brought out by other speakers this afternoon, stocks and scions, cultural practices, and environmental conditions all exert their influence on solids content.

BUT IT CAN BE SAID that in any particular year, additional water provided through irrigation will reduce the percentage of soluble solids in the fruit. In years of low rainfall, this supplemental water may increase fruit size and yields, under which conditions total pounds of soluble solids per acre may be increased even though there may be a reduced percentage in individual fruits. In years of more nearly normal rainfall, only a slight increase in yields can be expected from irrigation, and this will be more than offset by the decrease in the percentage of soluble solids.

This influence toward decreasing the percentage of soluble solids in the fruit militates against the indiscriminate use of irrigation.

**Literature Cited**

1. Sites, J. W. 1947. Internal fruit quality as related to production practices. Proc. Fla. State Soc. 60: 55-62.

2. —, J. J. Reitz, and E. J. Deszyck. 1951. Some results of irrigation research in Florida citrus. Proc. Fla. State Hort. Soc. 64: 71-79.

3. Voorhees, R. K., H. J. Reitz, and W. T. Long, 1951. Irrigation Experiments. State Project 508. Ann. Rpt. Fla. Agric. Expt. Sta, 1951: 152.

4. Ziegler, L. W. 1955. Irrigation studies with Marsh grapefruit on Lakeland fine sand in central Florida. Proc. Fla. State Hort. Soc. 68: 39-41.

## McNARY RETIRES FROM CITRUS COMM. JULY 31

One of the Florida citrus industry's more noted research scientists and a man who has been credited with helping develop many young and aspiring citrus scientists, will retire from active service July 31.

Dr. Robert Reed McNary, known for his long-term work on citrus by-products and waste treatment, had been a member of the Florida Citrus Commission's Research Department since December, 1945. He has been particularly recognized for his research on the manufacture of vinegar from citrus products, and has been author or co-author of 16 technical papers appearing in many professional scientific journals.

"Dr. McNary has been an outstanding member of our department for many years, and he will be sorely missed," according to Dr. L. G. MacDowell, director of research for the Commission. "His devotion to the citrus industry and its many research problems has been an inspiration to countless youthful scientists."

Another prominent scientist with whom Dr. McNary was closely associated is Dr. Herman J. Reitz, horticulturist in charge of the Citrus Experiment Station at Lake Alfred.

"Dr. McNary was one of the most substantial people on the Commission's staff," Dr. Reitz said. "He went out of his way to advise and help develop many of the young scientists we now have on the staffs of both the Commission and the Station."

## LADIES' ACTIVITIES CHAIRMAN APPOINTED FFV CONVENTION

Mrs. John W. Evans, Oviedo, has been appointed chairman of the Ladies' Activities Committee for the 16th Annual Convention of the Florida Fruit and Vegetable Association at Hotel Fontainebleau, Miami Beach, September 23, 24 and 25, according to an announcement by General Convention Chairman J. P. Harllee, Jr., Palmetto.

Mrs. Evans is a third-generation Floridian with a wide acquaintance among Fruit and Vegetable people all over the country. Her husband is secretary-treasurer of the firm of Nelson & Company.

# Concentrate Industry To Spend $3,300,000 Advertising Products

In an open letter to Florida Citrus Mutual's 10,000 grower members, Robert W. Rutledge, Mutual general manager today praised the concentrate industry for its decision to sponsor and finance a nation-wide advertising and promotional program for frozen orange concentrate.

He said the concentrator's program, which is in addition to the special advertising campaign to be carried out at the same time by the Florida Citrus Commission, will run over a 90-day period beginning in September.

Florida concentrators will voluntarily contribute more than $3,300,000 to carry out their special campaign.

"This unprecedented and far-reaching action assumes full significance in light of the fact that concentrators during the past season utilized more than 60 percent of all oranges grown in Florida," Rutledge said.

He said this action "recognizes the sound philosophy of 'selling' the product rather than 'giving' it away.

Rutledge said five major activities are incorporated in the concentrator's promotional plan. These are:

1. A record level of consumer type advertising in daily newspapers, supplements and magazines.
2. A promotional display program in retail stores vastly expanded over any previous effort.
3. Distribution of millions of coupons redeemable for the purchase of the product.
4. A $100,000 consumer sweepstakes with prize awards.
5. A trade sweepstakes, open to the entire grocery trade.

The main objectives of the plan are to gain new users for frozen orange concentrate and to increase consumption of the product by present users, Rutledge said.

Rutledge said the program comes at a time when "ample stocks of this past season's high quality pack of concentrate are available."

"It also comes at a time when anticipated success of the new campaign will have beneficial influence on the marketing of next season's crop," he said.

"The mere undertaking of this great program is proof that great strides have been taken and are being taken in the areas of cooperation and intelligent marketing," Rutledge said. "The success of the concentrator's program will clear the way for more of the same in making other important industry decisions."

"We congratulate the Florida concentrate industry for its fine spirit of cooperation and for the vision and imagination that it is demonstrating in working for the over-all benefit of the grower, handler and processor," he said.

## EUROPEAN ADVERTISING CAMPAIGN IS PLANNED

The Florida citrus industry is assured of another hard-hitting advertising and merchandising program in Western Europe and the Scandinavia this Fall, according to word received here from Frank D. Arn, director of advertising and merchandising for the Florida Citrus Commission.

Arn said he met today with top officials of the Foreign Agricultural Service, U. S. Department of Agriculture in Washington, and worked out plans for U. S. marketing assistance under provisions of Public Law 480. He said the Commission would spend $178,000 for Florida citrus advertising and promotion in Europe with the U. S. supplementing this with "well over $100,000."

Arn said it would be the third year that the Foreign Agricultural Service had participated in the program.

Considerable support for continuation of the program had previously been lent when Commission General Manager Homer E. Hooks cabled Senator Spessard Holland from Europe earlier that it should be continued because "our industry derives direct benefits." Hooks is in England with a U. S. Grapefruit Mission attempting to have British import restrictions eased.

"For the previous two years, the government allocated the equivalent of $102,000 and $106,000 respectively in foreign currencies to supplement out program," he declared. "The first two campaigns have been extremely benefical in helping promote Florida citrus products — fresh, canned and frozen — on the Continent."

Arn said that as a result of the meeting, the Commission would be advised shortly what foreign currencies would be available. He said plans call for production of special advertising and educational films, almost a million colorful recipe booklets printed in foreign languages, and print advertising in foreign publications.

# What The Fresh Fruit Industry Wants

By R. V. PHILLIPS

Presented at Annual Meeting of Citrus Growers Institute,
At Camp McQuarrie, Aug. 13, 1959

The subject assigned to me today, "What the Fresh Fruit Industry Wants" is not a difficult subject to talk about, but you are apt to hear some of the same things suggested and recommended that you have been hearing over and over for many years. However, I am told that we must be reminded repeatedly of even the things that are important. An advertising expert calls this "repetitious advertising". So—no matter what subject is discussed here today, nor how strong some recommendations might be, you will come here again next year to be reminded of what you heard this year.

Last year I appeared on this program, and my subject was "Trends in the Fresh Fruit Industry". I am appearing before you today as a substitute for John T. Lesley, who I understand is abroad at the present time. I believe it would have been more appropriate if the person who was to handle this subject were one who is in the fruit buying market rather than one who manages a cooperative, as I do, which has its own caretaking facilities and provides complete care and maintenance for all its membership. Because we supervise our production, we should not only know what we want in the way of quality, but should be able to produce it. However, you people in the producing end of the business know that circumstances, mainly weather conditions, prevent the growing of exactly the grade and quality fruit that might be desired by the Fresh Fruit Industry.

In discussing this subject further, it is well to take a look at "General Marketing Trends", especially on Orange Products. In looking back to the year 1950, and up to the present time, we find the population has increased at an annual rate of 2,750,000—representing a 17% and 25 million increase.

Total consumer income has increased at a rate of approximately three times that of the population—with expenditures in food stores increasing at even faster rates. While part of the dollar increase in grocery stores reflects higher food costs and sales of non-food items, the American family is eating more and better than in 1950. Grocery store volume is concentrating in fewer and larger stores. Number of items carried in a typical grocery or super-market has virtually doubled, with a market increase in the availability of ready-to-eat and convient foods. When we speak of convenient foods, immediately my mind points to the comparison of fresh fruit versus processed products.

In referring specifically to our major product, Oranges, since 1950 newer orange products, for instance, frozen concentrate and chilled orange juice, highlighted the 60% increase in home usage from 1950 - 1957. Despite the 1950 crop failures, usage in 1958 was still 27% above 1950. That American consumers are consuming more "breakfast type" juices in total is evident from the fact that per capita usage of other canned fruit and vegetable juices also increased.

Major shifts in home consumption of fresh oranges by types of families have occurred with reduced volumes for this item. Per capita home usage of fresh oranges was substantially reduced among younger families with children, and families in the middle income bracket. Conversely, usage has been maintained among older families, and families in the upper and lower income groups.

Records indicate that frozen concentrate has made substantial progress among all family groups, with per capita usage; however, substantially above average among the upper income groups. With increasing family incomes and an increasing demand for higher education, the implications of this pattern of frozen orange concentrate are obvious. However, there appears to be opportunities for substantial expansion of frozen orange concentrate among families in the lower income group, and those of lessor schooling. Because of the short 1958 orange supply and the fact that fresh oranges were more expensive than in previous years, consumers purchased less fresh fruit. Those who did purchase the large volume of the fresh oranges shipped were in the higher income group.

So much for the "trends" in buying, but before we leave the subject, I think we should consider long and hard the findings of the Market Research Corporation which shows that from 1950-1957 the per capita home usage of fresh oranges was substantially reduced among younger families with children and families in the middle income bracket; while, at the same time, it was maintained among older families and families in the upper and lower income groups.

Now, let's get down to the real subject to be discussed, of "What the Fresh Fruit Industry Wants." Having been a Sales Manager for some years, I recall invariably the insistance of fresh fruit buyers for good quality and color in their purchases of fresh oranges, grapefruit, and tangerines. Every grower and shipper knows that consumers prefer and demand a pretty, clean, good-colored fruit. If it is Oranges, it must be a deep orange color; Grapefruit must be a rich yellow color; and Tangarines must have a deep Tangerine color. If the fruit is Limes, the color must be green; Lemons must be yellow; and Apples must be red. Records indicate that more than 95% of the people prefer a red apple. I mentioned this matter of color only to remind you that Mrs. Consumer knows what type of fruit she wants to buy; and, I, personally, want no part of the job of trying to market yellow Limes, green colored Oranges or grapefruit, or apples other than red apples.

With continuous progress being made in frozen products, it behooves each and every grower to produce the best quality possible, with the thought in mind that it be shipped fresh. In doing this, I realize that too much money cannot be spent—especially if the price of the product is low. On the other hand, there must be some growers who are willing to continue to produce fruit

for the fresh fruit market. It has long ago been established that the tree which is well taken care of, and that produces a good clean orange, produces at the same time more oranges; and it is a long-established fact too that a good colored U. S. No. 1 Grade Orange contains higher solids and more juice than does a lower grade, with poor color or other defects.

Now, looking ahead to the future, it appears to me that the job of expanding the Fresh Fruit Market is going to be a tough one. It is going to develop that there will be less shippers in the business, and they will continue to consolidate, as has been done in other fresh fruit producing areas, such as California. It has been said that some of these days most of the Valencia and Pineapple Oranges will be used in processed products — mainly frozen orange concentrate, and I am inclined to share this belief. Therefore, it seems that the fresh fruit industry will want, because the consumer will demand, the varieties of fruit which are easy to peel, such as Tangerines, Murcotts, Tangeloes, Temple Oranges, and other similar varieties, now in the making, which can be eaten out of hand.

So, to you Mr. Grower, I say the desires of the Fresh Fruit Industry are that you produce a fruit shippers can sell to Mrs. Consumer, whom we must realize makes the final choice. Mrs. Consumer wants the firm, good-looking fruit that seems to hold the promise of lots of sweet juice when she peels it or squeezes it. What I have just said sounds like an appeal to return of high-quality fruit selection, doesn't it? Well, that's absolutely right! I think we have to start improving our grades in the field, and our packs in the packing plant. We must take the attitude that our "backs are not to the wall", and that the best quality of shipment of fresh fruit is our only salvation. Shippers must begin to think in terms of shipping high solid fruit to the fresh fruit market, and send the varieties with low solids to the single-strength plant, where sugar can be added to improve the quality. The present trend is to ship the low solid fruit fresh, and send the high solid to the precessors. We've been giving "lip service" to quality long enough. Now, let's do something about it.

So far my remarks have been directed to you growers, but I have a word to say to the Fresh Fruit Packers as well as to the agencies which advertise our products. To the Fresh Fruit Packer, let me say now that assuming you get the type fruit from the grower you desire, it is up to you to see that it is properly picked, not plugged. It must be transported to the packing plant and handled in the plant properly. Good grading and packing is necessary, and when that is done the fruit should be transported to the market under proper refrigeration. There the buyer, as well as the consumer, should be instructed how to handle the fruit until it is consumed. This is an educational job, which has been performed by the packers of frozen concentrate, and it should and must be done by fresh fruit packers if the industry is to prosper.

In closing, I want to touch briefly, and as tactfully as possible, on the subject of advertising fresh fruit Having been told that I know nothing about advertising, I shall make my remarks very brief. On the other hand, I think laymen recognize effective advertising when we see it. It appears to me that the fresh fruit industry wants good, effective advertising. They want to see large displays in the supermarkets. This is the responsibility of the Commission, and I feel the Commission is doing a good job with the number of personnel they have in the markets—but, the number should be increased, and the representatives should be more highly trained before they are put into the field. Then, I think the advertising agency should find ways of advertising fresh fruit competitively with processed products. The fresh fruit industry wants this. Our neighbors in California find a way. They tell us that a person gets Protopectin and Bio-Flavanoids only when he eats the fresh fruit, and I believe this has been a strong factor in maintaining the consumption of fresh oranges, especially among older people. I sincerely believe that not only the fresh fruit industry wants more effective, hard-hitting, convincing advertising, but the packers of both fresh and processed fruit want this type of advertising, and we must have it.

If the advertising agency we now have does not come forth with a stronger, harder-hitting advertising program, I think it is the responsibility of the Florida Citrus Commission members to insist that they do. There is so much good that can be said about the health-giving benefits of citrus, and some good statements, claims and guarantees, can be made. We are living in an age today where every manufacturer of a product has a "claim" for it, and he guarantees it. The citrus producer can make more claims and guarantees and back it up than any product I know of, but we must have the desire and "guts", if you please, to tell the world about it. Advertising agencies seem to be afraid to make these claims and guarantees. They say they're afraid of the Federal Trade Commission. But, listen my friends, the makers of "Bufferin" tell the world that Bufferin will act three times faster than Asprin tablets. They're not afraid of the Federal Trade Commission. Evidently they can prove it. What the Fresh Fruit industry wants is to have some advertising that will blast "Tang" from the store shelves. I understood our present agency has come up with the slogan, "GET YOUR VITAMINS THE NATURAL WAY". I like that slogan, but let's get it out of the script, and put in headlines, in big letters. When you see "CYPRESS GARDENS" advertised, you don't see small signs and small letters.

And, lastly, while I made this statement in my talk right here on this platform last year, it did not seem to register even with the press. I said that it was high time that our advertising tax on citrus fruit be increased.

## TRAVELERS ABROAD HAVE RESPONSIBILITY TO U. S. FARMERS, U. S. D. A. SAYS

Tourists tucking foreign fruits, plants, meat, or plant products into their baggage to bring home as souvenirs or gifts may be bringing dangerous crop or livestock pests back unnoticed, the U. S. Department of Agriculture reports.

"One pest can do it," says E. P. Reagan, in charge of foreign plant quarantine enforcement for USDA's Agricultural Research Service. "Just as one smoldering cigarette can start a forest fire, one diseased plant or one female insect pest ready to lay eggs could devastate a segment of U. S. Agriculture." He cited the chestnut blight that destroyed millions of trees in the eastern U. S. and the Mediterranean fruit fly, which cost $10 million to eradicate from Florida in 1957, as examples of costly foreign invaders.

Increasing foreign travel increases also the responsibility of tourists to refrain from bringing into the U. S. exotic plants and foods.

Travelers planning to bring back unprocessed foods, plants, seeds, or animal products for special purposes should request a permit, before leaving the States, from the Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C. Prohibited products, as well as restricted items not covered by permit, are subject to confiscation.

Last year a mountain of incoming baggage—almost 20 million pieces—at U. S. ports of entry was inspected for dangerous plant and animal materials by USDA in cooperation with U. S. Customs. This was an increase of more than 20 percent over the 1957 total.

---

There were 49.3 million pounds of of chickens produced in Florida in 1958 for an income of $8.5 million. This was made up from 14.2 million pounds of farm chickens with a $2.1 million value and 35.1 million pounds of commercial broilers valued at $6.4 million.



## Classified Ads

# "ORTHO® spray materials assure me of better application"

"ORTHO spray materials have given the smoothest mixes tank after tank, assuring me of better application," reports Bill Sachsenmaier of Sachsenmaier Groves at Avon Park, Florida (pictured above, right, with ORTHO Fieldman Joe Murphy). "And, I place a high value in the way ORTHO people take a sincere interest in my groves. Their deliveries have always been punctual and prompt and their field service timely."

**Leading Florida Citrus Growers acclaim ORTHO field service and products. Here's why:** When you buy ORTHO products, all the personal, on-your-ground technical advice and services of your ORTHO Fieldman are provided gladly and without any extra charge. Too, with ORTHO, you're associated with the company that first developed highly refined petroleum oil sprays in the form of new type emulsions and ready-mixes. This scientific research and technical experience have made ORTHO Field Service and products the choice of Florida citrus growers for over 34 years.

ORTHO®

**Helping the World Grow Better**

California Spray-Chemical Corp.
A subsidiary of California Chemical Co.
P. O. Box 7067, Orlando, Florida

T. M. REG. U. S. PAT. OFF.: ORTHO ON ALL CHEMICALS, READ DIRECTIONS AND CAUTIONS BEFORE USE.

**Contact your nearest ORTHO Fieldman today:**

Lake Alfred: J. S. Murphy, Jr. • Lakeland: Jean E. Mabry • Leesburg: Charles Ashley
Orlando: Cliff Sutton • Orlando: John Nowell • Deland: Randall Williams • Plant City: Webster B. Carson

# A GREAT MANY OF FLORIDA'S MOST SUCCESSFUL GROWERS HAVE FOUND FROM EXPERIENCE THAT

# LYONS FERTILIZERS PRODUCE MAXIMUM CROPS OF FINEST QUALITY



**LYONS FERTILIZER COMPANY**

PHONE 43-101

TAMPA, FLORIDA